Amendments to the Claims

Claim 1 (Currently amended):

A method for modeling cellular metabolism of an

organism, comprising:

constructing a flux balance analysis model;

applying logic constraints to the flux balance analysis model.

Claim 2 (Currently amended) The method of claim 1 wherein the <u>logic constraints</u> include constraints selected to protect against violation of a kinetic barrier.

Claim 3 (Currently amended): The method of claim 1 wherein the <u>logic</u> constraints further include a set of connectivity restraints.

Claim 4 (Original): The method of claim 1 further comprising the step of applying mixedinteger linear programming to solve for a desired metabolic outcome.

Claim 5 (Original): The method of claim 1 further comprising the step of solving for a desired metabolic outcome.

Claim 6 (Original): A method for modeling cellular metabolism of an organism that improves upon a flux balance analysis model, comprising: constructing the flux balance analysis model; and applying a plurality of logic constraints to the flux balance analysis model.

Claim 7 (Original): The method of claim 6, further comprising selecting the set of logic constraints to protect against violation a kinetic or regulatory barrier.

Claim 8 (Original): The method of claim 6 wherein the logic constraints are defined by a relationship between changes in reaction fluxes and metabolic concentrations.

Claim 9 (Cancelled).

Claim 10 (Original): The method of claim 6 wherein the logic constraints are represented by binary variables.

Claim 11 (Original): The method of claim 10 wherein a first binary variable represents the presence of a reaction and a second binary variable represents the absence of a reaction.

Claim 12 (Original): The method of claim 6 further comprising applying a computational procedure to identify a minimal set of metabolic reactions.

Claim 13 (Original): The method of claim 12 further comprising selecting a growth rate, and wherein the step of applying a computational procedure is applying a computational procedure to identify the minimal set of metabolic reactions capable of supporting the growth rate.

Claim 14 (Original): The method of claim 6 further comprising the step of applying mixedinteger linear programming to solve for a desired metabolic outcome. Claim 15 (Currently amended): The method of claim 6 further comprising the step of solving for a desired metabolic outcome.

Claim 16 (Currently amended): The method of claim 15 further comprising engineering [[a]]the change in an organism based on the desired metabolic outcome.

Claims 17-18 (Cancelled).

Claim 19 (Currently amended): A system for modeling cellular metabolism of an organism, comprising:

a flux balance analysis model;

a plurality of <u>logic</u> constraints applied to the flux balance analysis model, the <u>logic</u> constraints selected from the set consisting of qualitative kinetic information constraints, qualitative regulatory information constraints, and differential DNA microarray experimental data constraints.

Claim 20 (Currently amended): The method of claim 1 wherein the <u>logic</u> constraints further include qualitative regulatory information constraints.

Claim 21 (Currently amended): The method of claim 20 wherein the <u>logic</u> constraints include <u>logic</u> constraints selected to protect against violation of a regulatory barrier.

Claim 22 (Currently amended): The system of claim 1 wherein the <u>logic</u> constraints further include DNA experimental data constraints.

Claim 23 (Currently amended): A method for modeling cellular metabolism of an organism, comprising: constructing a flux balance analysis model;

applying constraints to the flux balance analysis model, wherein the constraints include qualitative regulatory information constraints and differential DNA microarray experimental data constraints.

Claim 24 (Previously presented): The method of claim 23 wherein the constraints include logic constraints selected to protect against violation of a regulatory barrier.

Claim 25 (Previously presented): The method of claim 23 wherein the constraints further include connectivity restraints.

Claim 26 (Previously presented): The method of claim 23 further comprising applying mixed-integer linear programming to solve for a desired metabolic outcome.

Claim 27 (Previously presented): The method of claim 23 further comprising solving for a desired metabolic outcome.

Claim 28 (Cancelled).

Claim 29 (Previously presented): A method for modeling cellular metabolism of an organism, comprising:

constructing a flux balance analysis model;

applying constraints to the flux balance analysis model, wherein the constraints include differential DNA microarray experimental data constraints.

Claim 30 (New): A method for modeling cellular metabolism of an organism that improves upon a flux balance analysis model, comprising: constructing the flux balance analysis model; applying a plurality of logic constraints to the flux balance analysis model; and applying mixed-integer linear programming to solve for a desired metabolic outcome.

Claim 31 (New): The method of claim 30 further comprising the step of solving for the desired metabolic outcome.

Claim 32 (New): The method of claim 31 further comprising engineering a change in the organism balance on the desired metabolic outcome.